CLAIMS

1.- A method of registering various colours in flexography, implemented by means of a flexographic printer of the type that comprises at least one rotating supporting drum (1), which supports the material to be printed (2), and at least first and second printing groups (3, 4) which include some respective printing rollers (5, 6) with the same known printing length, with said first and second printing groups (3, 4) configured, arranged and selectively driven to change between a printing position, in which said first and/or second printing roller (5, 6) are in contact with said material to be printed (2) on the cited supporting drum (1), and an inactive position, in which the first and/or second printing roller (5, 6) are separated from the material to be printed (2), and where the first and second printing rollers (5, 6) are driven by at least one driving group (7, 8) regulated by at least one controller (9), being said method **characterised** in that it comprises the following steps:

a) placing the first printing group (3) at said printing position and second printing group (4) at said inactive position and print at least one first mark (13) on the material to be printed (2) by means of the first printing roller (5) of the first printing group (3);

b) detecting, by means of an optical sensor (12), located downstream from the first and second printing groups (3, 4), the position of said first mark (13) on the material to be printed (2), and generating a first position signal representative of the longitudinal and transversal positions of the first mark (13) within said printing length;

c) placing the first printing group (3) at said inactive position and the second printing group (4) at said printing position and print at least one second mark (14), separated from said first mark (12), on the material to be printed (2) by means of the second printing roller (6) of the second printing group (4);

d) detecting, bye means of said optical sensor (12), the position of said second mark (14) on the material to be printed (2) and generating a second position signal representative of the longitudinal and transversal positions of the second mark (14) within said printing length; and

e1) generating, by means of said controller (9), first and second adjustment signals in function of a comparison between each of said first and second position signals and a pre-established position signal; and

f1) adjusting, by means of said at least one driving group (7, 8), the angular and axial positions of the first and second printing rollers (5, 6) based on said first and second adjustment signals; or

e2) generating, by means of said controller (9), an adjustment signal in function of a comparison between the second position signal and the first position signal, which is taken as reference; and

f2) adjusting, by means of said at least one driving group (8), the angular and axial positions of the second printing roller (6) based on said adjustment signal in accordance with the detected position of the first mark (13) within said printing length.

2. – A method in accordance with claim 1, characterised in that said flexographic printer includes further printing groups placed upstream from said optical sensor (12) configured, arranged and selectively driven in order to change between said printing and inactive positions, with said further printing groups having respective printing rollers with the cited known printing length, driven by at least one driving group controlled by said at least one controller (9), with the method also comprising:

g) sequentially placing each further printing group in said printing position maintaining the other first, second and further printing groups in the inactive position, and printing further separated marks on the material to be printed (2) by the printing rollers of the further printing groups.

h) sequentially detecting, by means of said optical sensor (12), the positions of said further marks on the material to be printed (2), and generating further position signals representative of the longitudinal and transversal positions of the respective further marks within said printing length; and

i1) generating, by means of said controller (9), further adjustment signals in function of a comparison between each of said further position signals and the mentioned pre-established position signal; and

i2) adjusting, by means of the corresponding driving groups, the angular and axial positions of the further printing rollers based on said further adjustment signals; or

j1) generating, by means of said controller (9), further adjustment signals in function of a comparison between each of said further position signals and the first position signal, which is taken as reference; and

j2) adjusting, by means of the corresponding driving groups, the angular and axial positions of each further printing roller (6) based on said further adjustment signals in accordance with the detected position of the first mark (13) within said printing length.

3. – A method in accordance with claim 2, characterised in that the first, second and further marks (13, 14) have a triangular shape and comprise a transversal edge that is perpendicular to a longitudinal lateral edge of the material to be printed (2), a longitudinal edge parallel to said lateral longitudinal edge of the material to be printed (2) and an oblique edge.

4. – A method in accordance with claim 3, characterised in that the first, second and further printing rollers (5, 6) of the flexographic printer are driven by respective first, second and further driving groups (7, 8) and are associated with respective first, second and further angular position detectors (10, 11), and in that:

- the cited longitudinal positions of the respective first, second and further marks (13, 14) within said printing length are determined from respective readings of angular position signals coming from the first angular position detector (10) of the first printing roller (5) at the times of detecting a front edge, constituted either by said transversal edge or by said oblique edge, of each of the respective first, second and further marks (13, 14) by the optical sensor (12); and

- the cited transversal positions of the respective first, second and further marks (13, 14) within said printing length are determined from a difference between readings of angular position signals coming from the first angular position detector (10, 11) of the first printing roller (5) at the times of detecting the transversal or oblique edges, respectively, or vice versa, of each of the respective first, second and further marks (13, 14) by the optical sensor (12).

5. – A method in accordance with claim 3, characterised in that the first, second and further printing rollers (5, 6) of the flexographic printer are driven by respective first, second and further driving groups (7, 8) driven by an angular position control signal with respect to time common to all of them, or set point signal, and in that:

- the cited longitudinal positions of the respective first, second and further marks (13, 14) within said printing length are determined from a reading of said set point signal at the time of detecting a front edge, whether said transversal edge or said oblique edge, of each of the respective first, second and further marks (13, 14) by the optical sensor (12); and

- the cited transversal positions of the respective first, second and further marks (13, 14) within said printing length are determined from a difference between readings of said set point signal at the times of detecting the transversal and oblique edges respectively, or vice versa, of each of the respective first, second and further marks (13, 14) by the optical sensor (12).

6. – A method in accordance with claim 3, characterised in that the first, second and further printing rollers (5, 6) and the supporting drum (1) of the flexographic printer are rotationally driven by a single common driving group and the supporting drum (1), or any of the printing rollers or other kinematically related element, is associated with at least one angular position detector; and in that:

- the cited longitudinal positions of the respective first, second and further marks (13, 14) within said printing length are determined from readings of respective angular position signals coming from said angular position detector at the times of detecting a front edge, constituted either by said transversal edge or said oblique edge, of each of the respective first, second and further marks (13, 14) by the optical sensor (12); and

- the cited transversal positions of the respective first, second and further marks (13, 14) within said printing length are determined from a difference between readings of angular position signals coming from the angular position detector at the times of detecting the transversal and oblique edges, respectively, or vice versa, of each of the respective first, second and further marks (13, 14) by the optical sensor (12).

7. – A method in accordance with claim 3, characterised in that the first, second and further marks (13, 14) are printed in a side margin of the material to be printed (2), free from a main print motif (15, 16, 19).

8. - A method in accordance with claim 4, characterised in that the first printing roller (5) is maintained rotating at a printing rotating speed when placed at said inactive position after having detected the longitudinal and transversal positions of the first mark (13) printed by the same within the printing length.

9. - A method in accordance with claim 1 or 2, characterised in that the first printing group (3) is placed in a position that is more downstream than the second printing group (4) and further printing groups.

10. - A method in accordance with claim 1 or 2, characterised in that said optical sensor (12) is a chromatic optical sensor.

11.- A flexographic printer with a various colours printing register device, with the printer being of type that comprises at least one rotating supporting drum (1), which supports the material to be printed (2), and at least first and second printing groups (3, 4) which include respective printing rollers (5, 6) with the same known printing length, with said first and second printing groups (3, 4) configured, arranged and selectively driven to change between a printing position, in which said first and/or second printing roller (5, 6) is in contact with said material to be printed (2) on the cited supporting drum (1), and an inactive position, in which the first and/or second printing roller (5, 6) is separated from the material to be printed (2), being the first and second printing rollers (5, 6) driven by at least one driving group (7, 8) regulated by at least one controller (9), **characterised** in that it comprises an optical sensor (12) placed downstream from the first and second printing groups (3, 4) and arranged to detect at least first and second separated marks (13, 14), respectively and consecutively printed by the first and second printing rollers (5, 6) on the material to be printed (2); with said controller (9) adapted and connected to:

receive from said optical sensor (12) first and second position signals representative of the longitudinal and transversal positions of the respective first and/or second marks (13, 14) within said printing length; and

generate first and second adjustment signals in function of a comparison of each of said first and second position signals with a pre-established position

signal, said at least one driving group (7, 8) adjusting, based on said first and second adjustment signals, the angular and axial positions of the first and second printing rollers (5, 6); or

generate an adjustment signal in function of a comparison of the second position signal with the first position signal, which is taken as reference, said at least one driving group (7, 8) adjusting, based on said adjustment signal, the angular and axial positions of the second printing roller (6) in accordance with the detected longitudinal and transversal positions of the first mark (13) within the printing length.

12. – A printer in accordance with claim 11, characterised in that it includes further printing groups placed upstream from said optical sensor (12) configured, arranged and selectively driven in order to change between said printing and inactive positions, with said further printing groups having respective printing rollers with the cited known printing length, driven by at least one driving group controlled by the cited at least one controller (9), being said controller (9) adapted and connected also to;

receive from said optical sensor (12) further position signals that are representative of the longitudinal and transversal positions of the respective further marks within the printing length; and

generate further adjustment signals in function of a comparison of each of said further position signals with a pre-established position signal, said at least one driving group adjusting, based on said further adjustment signals, the angular and axial positions of the further printing rollers; or

generate further adjustment signals in function of a comparison of the further position signals with the first position signal, which is taken as reference, said at least one driving group adjusting, based on said further adjusting signals, the angular and axial positions of the further printing rollers in accordance with the detected longitudinal and transversal positions of the first mark (13) within the printing length.

13. – A printer in accordance with claim 12, characterised in that the first, second and further marks (13, 14) have a triangular shape and comprise a transversal edge that is perpendicular to a longitudinal lateral edge of the material to be printed (2), a longitudinal edge parallel to said lateral longitudinal

edge of the material to be printed (2) and an oblique edge, and the optical sensor (12) is arranged to consecutively detect the positions of the transversal and oblique edges, or vice versa, of the respective first, second and further marks (13, 14) when the material to be printed (2) is moved under the same.

14. – A printer in accordance with claim 13, characterised in that the first, second and further printing rollers (5, 6) comprise corresponding engraving configurations (13a, 14a) arranged to print said first, second and further marks (13, 14) in a side margin of the material to be printed (2), free from a main print motif (15, 16).

15. – A printer in accordance with claim 11 or 12, characterised in that the first and second printing rollers (5, 6), or first, second and further printing rollers (5, 6) are driven by respective first and second driving groups (7, 8) or first, second and further driving groups (7, 8) and are associated with respective first and second angular position detectors (10, 11) or first, second and further angular position detectors (10, 11).

16. – A printer in accordance with claim 11 or 12, characterised in that the first and second printing rollers (5, 6), or first, second and further printing rollers (5, 6) are driven by respective first and second driving groups (7, 8) or first, second and further driving groups (7, 8) driven by an angular position control signal with respect to time that is common to all of them, or set point signal.

17. – A printer in accordance with claim 11 or 12, characterised in that the supporting drum (1) and the first and second printing rollers (5, 6) or the supporting drum (1) and the first, second and further printing rollers (5, 6) are rotationally driven by a single common driving group, and the supporting drum (1) is associated with at least one angular position detector.

18. – A printer in accordance with claim 15, characterised in that the first printing roller (5) is driven to rotate at a printing rotating speed while the first printing group (3) is placed at the inactive position and said comparison of the second position signal or second and further position signals with the first position signal is performed.

19. - A printer in accordance with claim 11 or 12, characterised in that said optical sensor (12) is a chromatic optical sensor.

20. - A printer in accordance with claim 11 or 12, characterised in that the first printing group (3) is placed in a position that is more downstream than the second printing group (4) and further printing groups.

21. – A printer in accordance with claim 11 or 12, characterised in that the optical sensor (12) is placed to scan a lateral margin (20) of the material to be printed (2), while the material to be printed (2) is on the supporting drum (1) and moves along with it in order to detect the first and second marks (13, 14).

22. – A printer in accordance with claim 15 or 16, characterised in that each of the first and second driving groups (7, 8) or first, second and further driving groups (7, 8) include at least one rotating driving motor to rotate the corresponding printing roller (5, 6) and at least one linear driving motor to linearly move the corresponding printing roller (5, 6) in the axial direction.

23. - A printer in accordance with claim 22, characterised in that at least one angular position detector is associated with said linear driving motor.